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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/724,551	11/28/2003	Eliseo R. Ranalli	RANALLI-3	1851

1054 7590 07/02/2008

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EXAMINER	
CHANG, AUDREY Y	

ART UNIT	PAPER NUMBER
2872	

MAIL DATE	DELIVERY MODE
07/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/724,551	RANALLI, ELISEO R.	
	Examiner	Art Unit	
	Audrey Y. Chang	2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *11-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *11-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **October 31, 2007** has been entered.

2. This Office Action is also in response to applicant's amendment filed on October 31, 2007, which has been entered into file.

3. By this amendment, the applicant has amended claims 11-16 and 18.

4. Claims 11-18 remain pending in this application.

Response to Amendment

5. The amendment filed on **October 31, 2007 is** objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **claims 11-13 have been amended** to include the phrase "reflective facet portions selective disposed in a non-constant period arrangement", and **claims 11-13 have been amended** to include the phrase "unequal in spacing and width dimension".

The specification FAILS to disclose explicitly that the reflective facet portions are disposed at a non-constant period arrangement. The specification fails to give explicit teachings about the spacing and width dimensions being unequal for the facet portions. In fact the specification fails to identified what is considered to be the "spacing" and what is considered to be the "width dimension" of the facet portions.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. **Claims 11-18 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on the newly added matters are set forth in the section "response to amendment" above.

8. **Claims 11-18 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the **enablement requirement**. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification and the claims fail to teach how could the reflective facet portions is capable of being disposed in "a non-constant period arrangement". In particular, the specification fails to disclose what is considered to be the period with respect the plurality of facet portions. This means "non-constant period arrangement" really cannot be defined.

The specification and the claims also fail to teach how could the “entrance and exit apertures” be operable to “*spatially single mode filter an optical field*". An aperture is just an opening. It is not clear how could these “openings” be “spatially single mode filter an optical field”. It is not clear single mode of what is being achieved here?

Claim Objections

9. Claims 11-18 are objected to because of the following informalities:

(1). The phrase "a non-constant period arrangement" recited in claims 11-13 is confusing since it is not clear what is considered to be the period. Does this mean the dimension of each facet portion is considered to be a period or not?

(2). The phrase "respective frequency in Hz" recited in claims 11-13 is confusing since it is not clear the frequency is referred to frequency of what?

(3). The "amplitude A (v)" and the "phase "Θ (v)" recited in claims 11-13 are confusing since it is not clear the amplitude and phase are the measures of what?

(4). The phrase "respective facets of at least a pair of contiguous reflective facets portions being unequally in spacing and width dimension" is confusing since it is not clear what is considered to be the "spacing" and the "width dimension" here? It is not clear of the spacing is referred to the space between two adjacent facet portions or the dimension of the facet portion itself?

(5). It is not clear how could the apertures capable of filtering an optical field?

(6). The phrases "facet portions" and the phrase "facets" are being used through out the claims. if they are referred to the same thing please amend the claims so that just one terminology is used.

(7). It is not clear what does it mean by "realizing an arbitrary narrow-band temporal optical transfer function" as recited in claim 12? It is understood that any optical element has an inherent "transfer function". It is **arbitrary** narrow band then this mean any optical element can achieve it.

(8). The phrase "sampling interval T seconds" recited in claim 13 is confusing and indefinite since it is not clear the sampling is about what? What is being sampled here? . The phrase "selecting sampling interval T seconds … over which a predetermined narrow-band temporal optical transfer function H (v) is uniquely specified" recited in claim 13 is confusing and indefinite since this phrase seems to be going a circle. It is known that without the H (v) function being **specified** the sampling

interval can be selected **arbitrarily** and any function once being specified is uniquely specified. This phrase therefore is not making any sense as far as the limitations concerns.

(9). The steps (c) and (d) recited in claim 13 are not definite since the following symbols "H(v), h_m, "vc", and "m" have not been defied or given physical meanings. The equation recited therein therefore has no meanings.

(10). It is not clear what is considered to be the characteristic curve for H(v) as recited in claim 13. What is considered to be the "impulse response"? What is the "delay"?

(11). Claim 13 includes numerous mathematical functions, symbols and terminology, that are without any physical means associated with it. The applicant is respectfully reminded that mathematical symbols and functions are ABSTRACT objects, until they are associated with physical meanings, they yield no meanings to the fabrication of the echelle structure.

(12). The phrase "the input and output beams are collimated" recited in claim 14 is unclear since it lacks proper antecedent basis from it base claim.

(13). The phrase "coated for increased reflectivity" recited in claim 15 is unclear since it is not clear it is being coated with what?

(14). It is not clear how could the aperture comprises an optical fiber as recited in claim 17. It is better read as "a single-mode optical fiber provides said entrance aperture".

(15) The phrase "resulting from the collimation of the single-mode entrance aperture" recited in claim 12 is confusing since it is not clear if the light beam is collimated by the collimating means or the entrance aperture? The paragraph concerning the "means of collimating optical outputs" is confusing since it is not clear what are this means and what part of the light beam is being collimated?

Appropriate correction is required.

Drawings

10. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the "means of collimating" for optical output of the exit apertures (claim 12) and "single mode slab waveguide" with the echelle structure formed in an edge of the slab waveguide, (claim 18), must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claim 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Hetrick (PN. 4,991,934) in view of the patent issued to Hetrick (PN. 4,798,446).

Hetrick ('934) teaches a **varied space** *diffraction grating* (12, Figures 1-2) for a monochromator (Figure 1) that serves as the *echelle* structure wherein the diffraction grating has a grating surface with a plurality of *contiguous* grooves (please see Figure 2) that reflects the incident light, wherein the groove space is varied so that the grooves are disposed in a *non-constant period arrangement*. It is implicitly true that at lest one pair of the adjacent grooves of the diffraction grating is unequally in space and width dimension.

It is implicitly true that the echelle type diffraction grating has an ***inherent*** optical transfer function, (which describes the optical action of the diffraction grating acts upon the incident light), and it is implicitly true that the optical transfer function is a *complex* function of frequency with amplitude and phase. One skilled in the art would know that Hz, or hertz, is the standard unit for frequency.

This reference has met all the limitations of the claims. Hetrick ('934) teaches that the diffraction grating is comprised of a plurality of reflecting contiguous grooves, (please see Figure 2). It however does not teach explicitly that the reflecting grooves are formed by plurality of reflective facet portions. Hetrick ('446) in the same field of endeavor teaches a reflecting diffraction grating having a plurality of reflecting contiguous grooves whose spacing are varied progressively, (please see Figure 2, column 2, lines 38-40). Hetrick ('446) further teaches that the plurality of reflecting contiguous grooves are formed by a plurality of reflecting facet portions (18, Figure 2). It would then have been obvious to one skilled in the art to apply the teachings of Hetrick ('446) to modify the echelle structure of the diffraction grating of Hetrick ('934) to use plurality of reflecting facet portions to form the reflecting grooves for the benefit of using a known design to facilitate the echelle structure or the diffraction grating.

13. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Hetrick (PN. 5,274,435) in view of the patent issued to Hetrick (PN. 4,789,446) and Sappey (PN. 6,647,182).

Hetrick teaches a *monochromator* and/or *spectrometer*, (please see Figures 3 and 12) serves as the optical device, that is comprised of *an entrance slit* (28) and *exit slit* (48) serve as *entrance aperture and exit aperture respectively*, and a *reflection type diffraction grating* (22) serves as the *echelle* structure that is disposed between the entrance and exit apertures. The diffraction grating has a grating surface (24) with a plurality of *contiguous* grating grooves (40) that reflect the incident light, and the groove space is *varied* so that the grooves are disposed in a *non-constant period arrangement*. It is implicitly true that at lest one pair of the adjacent grooves of the diffraction grating is unequally in space and width dimension, (please see column 5, lines 3-6 and column 11, lines 54-56). The monochromator and/or spectrometer further has collimating means (such as collimating mirror 38, please see column 4, line 38) for collimating the input beam so that components of the light beam incident on each reflection grooves is at the same angle. The diffraction grating and the optical system utilizing it implicitly realize an arbitrary transfer function.

This reference has met all the limitations of the claims. Hetrick ('934) teaches that the diffraction grating is comprised of a plurality of reflecting contiguous grooves, (please see Figure 2). It however does not teach explicitly that the reflecting grooves are formed by plurality of reflective facet portions. **Hetrick** ('446) in the same field of endeavor teaches a reflecting diffraction grating having a plurality of reflecting contiguous grooves whose spacing are varied progressively, (please see Figure 2, column 2, lines 38-40). Hetrick ('446) further teaches that the plurality of reflecting contiguous grooves are formed by a plurality of reflecting facet portions (18, Figure 2). It would then have been obvious to one skilled in the art to apply the teachings of Hetrick ('446) to modify the echelle structure of the diffraction grating of

Hetrick ('934) to use plurality of reflecting facet portions to form the reflecting grooves for the benefit of using a known design to facilitate the echelle structure or the diffraction grating.

Hetrick ("435) teaches that the reflection type reflection grating is disposed between an entrance aperture (28) and exit aperture (48) but it does not teach explicitly that the apertures enable single-mode filtering of the input optical field. It also does not teach explicitly that collimating means is to collimate the output from the diffraction grating and/or output from the exit aperture (the claim is NOT clear what part of the beam is being collimated by the means of collimation. No demonstration in the Figure is give either, this feature can only be broadly examined. **Sappey** et al in the same field of endeavor teaches essentially an optical system that is based on the dispersion property of an *echelle diffraction grating* (22, Figure 1) wherein a waveguide with single mode optical fibers (14 and 16) are used as the *input and output ports* for providing input light and for receiving output light. Sappey et al further teaches that a collimating lens (18) is used to collimate the output light from the entrance aperture to so that the light components incident on each facet of the reflective echelle grating at same angle and direct to the exit aperture at the same angle. It would then have been obvious to one skilled in the art to apply the teachings of Sappey et al to modify the arrangement of Hetrick if collimated input and output beam are desired.

14. Claims 13-14 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Hetrick (PN. 4,798,446) in view of Sappey et al (PN. 6,647,182).

Hetrick teaches a reflection grating (11, Figure 1 and 2) that serves as echelle structure wherein the diffraction grating is comprised of a grating surface including a plurality of reflective facet portions (18) with variable groove spacing such that the facet portions are disposed in a non-constant period arrangement. It is implicitly true that at least a pair of the reflective facet portions being unequal in spacing and width dimensions. Hetrick teaches that the reflection grating or echelle structure can be disposed in an optical system comprises aperture (33, Figure 3). But it does not explicitly identify an

entrance aperture although the object (27) essentially serves as the entrance aperture. **Sappey** et al in the same field of endeavor teaches essentially an optical system that is based on the dispersion property of an *echelle diffraction grating* (22, Figure 1) is disposed between entrance aperture and exit aperture of single mode optical fiber, (please se Figure 1). It would then have been obvious to one skilled in the art to apply the teachings of Sappey et al to make the reflection diffraction grating or echelle structure applicable in an optical system with entrance and exit apertures.

It is implicitly true that the reflection type diffraction grating or echelle structure has an *inherent* optical transfer function, (which describes the optical action of the diffraction grating acts upon the incident light), and it is implicitly true that the optical transfer function is a *complex* function of frequency with amplitude and phase. One skilled in the art would know that Hz, or hertz, is the standard unit for frequency. It is also implicitly true that one can find a sampling interval T seconds such that the optical transfer function is *uniquely* defined. The input light beam has to illuminate on a number M of the echelle facets and it is implicitly true that the number of the facets being illuminated must be greater than the inverse of the multiple of the minimum resolvable spectral feature W (or resolution) and the time interval T, since the dimension of the number of the facets being illuminated really is comparable to the wavelength separation between consecutive waves. And since it is known in the art that the optical transfer function for the echelle diffraction grating is a measure of how the input beam being acted upon by the grating, the reflected intensity or the amplitude of the input beam by each facet therefore has to be related to the optical transfer function, and it is implicitly true that reflected intensities of the input beam by all of the facets really defines the optical transfer function. It is therefore within the general skill of a worker in the art to find the optical transfer function H(v) that satisfies the equation stated in the claim.

This reference however does not teach *explicitly* that each of the facets is determined in the iteration steps stated in the claims. But as indicated in the paragraph above, since the mathematical relationship between the intensity of the reflected input beam by each facet and the optical transfer

function does inherently present, such steps of determination is either implicitly met or obvious modification to one skilled in the art, since after all Herrick does teach a echellette diffraction grating with a plurality of reflective facets. Certain method steps for determining the reflective facets have to be implicitly included.

With claims 17 and 18, Sappey et al in the same field of endeavor teaches a wavelength divisional multiplexing system that is based on the dispersion property of an echelle diffraction grating wherein a waveguide with single mode optical fibers (14 and 16) are used as the input and output ports for providing input light and for receiving output light. It would then have been obvious to one skilled in the art to use the waveguide structure as an alternative means for the light entrances and exit apertures for the benefit of more efficiently transporting the light beam.

15. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Hetrick ('934) and Hetrick ('446) as applied to claim 11 above, and further in view of the patent issued to Sappy et al (PN. 6,647,182).

The echelle structure or reflection type diffraction grating taught by **Hetrick ('934) in combination with the teachings of Hetrick ('446)** as described for claim 11 above have met all the limitations of the claims. These references do not teach explicitly that the diffraction grating is formed by a master and the facets are coated to increase the reflectivity. **Sappey** et al in the same field of endeavor teaches that a typical way of forming echellette diffraction grating is by using master to mold the grating profile and to coat the facets with *highly* reflective material, (please see column 10, lines 34-39). It would then have been obvious to one skilled in the art to apply the teachings of Sappey et al to make the reflective echellette type diffraction grating of Hetrick ('934 and '446) for the benefit of making the grating with master production method and to increase the reflectivity therefore efficiency of the grating by using highly reflective coating.

Response to Arguments

16. Applicant's arguments with respect to claims 11-18 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (9:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephone B. Allen can be reached on 571-272-2434. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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